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PATENT & TRADEMARK OFFICE

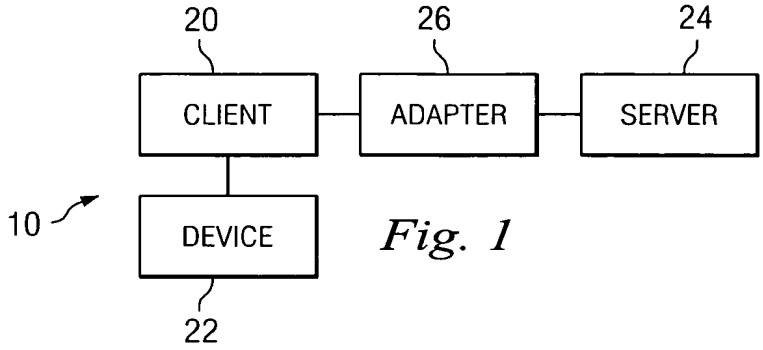

Fig. 1

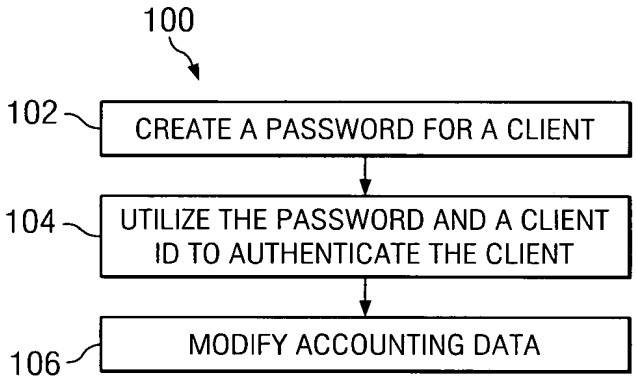

Fig. 2

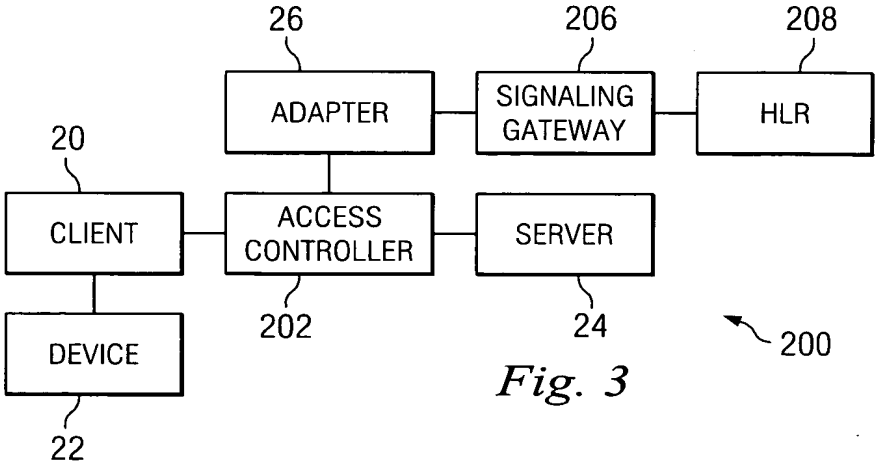

Fig. 3

Fig. 4a

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CDR FIELD 212	PRESENCE M=MANDATORY C=CONDITIONAL O=OPTIONAL	DESCRIPTION 216	SOURCE 218
RECORD TYPE	M (S-CDR/G-CDR)	THE FIELD IDENTIFIES THE TYPE OF THE RECORD e.g. S-CDR, G-CDR, M-CDR, S-SMO-CDR AND S-SMT-CDR.	ADAPTER 26 CHARGING APPLICATION
GGSN ADDRESS	M (S-CDR/G-CDR)	THE IP ADDRESS OF THE GGSN USED.	NETWORK MANAGEMENT, OR DURING PDP CONTEXT ACTIVATION
SGSN ADDRESS	M (S-CDR/G-CDR)	THE IP ADDRESS OF THE SGSN.	NETWORK MANAGEMENT
ROUTING AREA		ROUTING AREA AT THE TIME OF THE RECORD CREATION.	NETWORK MANAGEMENT, OR RECEIVED FROM THE CLIENT
LOCAL AREA CODE	O (S-CDR)	LOCATION AREA CODE AT THE TIME OF THE RECORD CREATION.	NETWORK MANAGEMENT, OR RECEIVED FROM THE CLIENT
CELL IDENTITY	O (S-CDR)	CELL ID AT THE TIME OF THE RECORD CREATION.	NETWORK MANAGEMENT, OR RECEIVED FROM THE CLIENT
GGSN ADDRESS USED	M (S-CDR)	THE IP ADDRESS OF THE GGSN CURRENTLY USED. THE GGSN ADDRESS IS ALWAYS THE SAME FOR AN ACTIVATED PDP.	WAIN SERVER CHARGING APPLICATION, OR DURING PDP CONTEXT ACTIVIATION
ACCESS POINT NameNI	M (S-CDR/G-CDR)	THIS FIELD CONTAINS THE LOGICAL ACCESS POINT NAME USED TO DETERMINE THE ACTUAL CONNECTED ACCESS POINT. APN COMPRISES OF MANDATORY NETWORK IDENTIFIER AND OPTIONAL OPERATOR IDENTIFIER (THIS FIELD IS THE NETWORK IDENTIFIER). APN CAN ALSO BE A WILDCARD, IN WHICH CASE SGSN SELECTS THE ACCESS POINT ADDRESS. SEE GSM 09.60 [22] AND GSM 03.60 [8] FOR MORE INFORMATION ABOUT APN FORMAT AND ACCESS POINT DECISION RULES. THE ACCESS POINT NAME IS INFORMATION FROM THE MS OR SGSN, THAT MAY BE USED BY THE GGSN TO DIFFERENTIATE BETWEEN ACCESSES TO DIFFERENT EXTERNAL PACKET DATA NETWORKS USING THE SAME PDP TYPE.	NETWORK MANAGEMENT, RECEIVED FROM THE CLIENT OR THE AP
APN SELECTION MODE	O (S-CDR/G-CDR)	THIS FIELD INDICATES HOW THE SGSN SELECTED THE APN TO BE USED. THE VALUES AND THEIR MEANING ARE AS SPECIFIED IN GSM 09.60 [22] CLAUSE 7.9 'INFORMATION ELEMENTS'.	MODE IS SELECTED BY THE ADAPTER 26 BASED ON THE SELECTION ALGORITHM

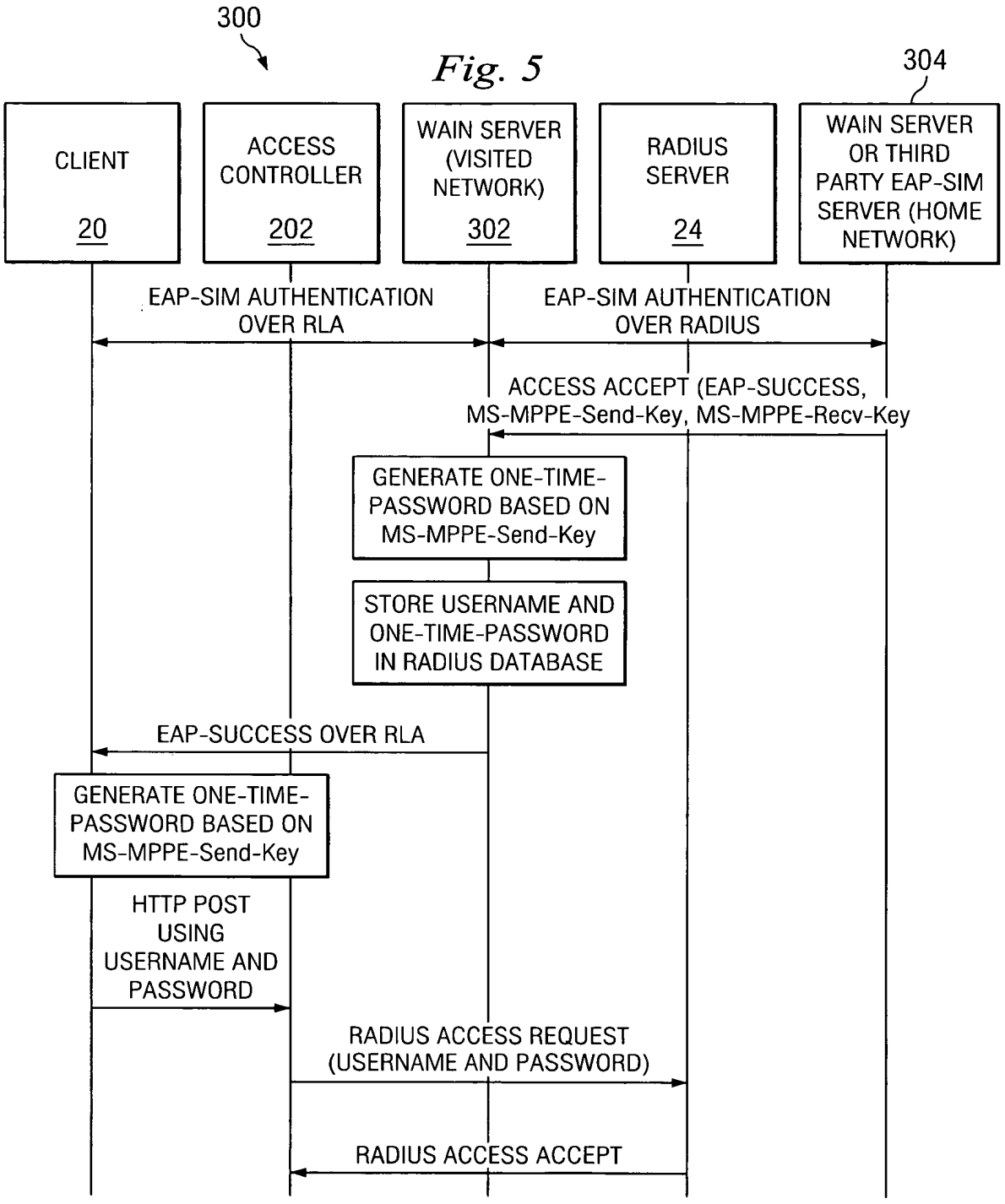
TO Fig. 4b

Fig. 4b

FROM FIG. 4a

PDP TYPE	M (S-CDR/G-CDR)	THIS FIELD DEFINES THE PDP TYPE, e.g. X.25, IP, PPP, OR IHOSS:OSP (SEE GSM 09.60 FOR EXACT FORMAT).	SELECTED BY THE TYPE OF PDP CONTEXT USED
DYNAMIC ADDRESS FLAG	C (G-CDR)	THIS FIELD INDICATES THAT PDP ADDRESS HAS BEEN DYNAMICALLY ALLOCATED FOR THAT PARTICULAR PDP CONTEXT. FIELD IS MISSING IF ADDRESS IS STATIC i.e. PART OF PDP CONTEXT SUBSCRIPTION. DYNAMIC ADDRESS ALLOCATION MIGHT BE RELEVANT FOR CHARGING e.g. THE DURATION OF PDP CONTEXT AS ONE RESOURCE OFFERED AND POSSIBLE OWNED BY NETWORK OPERATOR.	SELECTED BASED ON THE PDP ADDRESS SELECTION METHOD
NODE ID	O (S-CDR/G-CDR)	THIS FIELD CONTAINS AN OPTIONAL OPERATOR CONFIGURABLE IDENTIFIER STRING FOR THE NODE WHICH GENERATED THE CDR.	NETWORK MANAGEMENT
LOCAL RECORD SEQUENCE NUMBER	O (S-CDR/G-CDR)	THIS FIELD INCLUDES A UNIQUE RECORD NUMBER CREATED BY THIS NODE. THE NUMBER IS ALLOCATED SEQUENTIALLY INCLUDING ALL CDR TYPES. THE NUMBER IS UNIQUE WITHIN ONE NODE, WHICH IS IDENTIFIED EITHER BY FIELD NODE ID OR BY RECORD DEPENDENT NODE ADDRESS (SGSN ADDRESS, GGSN ADDRESS, RECORDING ENTITY). THE FIELD CAN BE USED e.g. TO IDENTIFY MISSING RECORDS IN POST PROCESSING SYSTEM.	ADAPTER 26 CHARGING APPLICATION
ACCESS POINT NAME OI	O (S-CDR)	THIS FIELD CONTAINS THE LOGICAL ACCESS POINT NAME USED TO DETERMINE THE ACTUAL CONNECTED ACCESS POINT. APN COMPRISES OF MANDATORY NETWORK IDENTIFIER AND OPTIONAL OPERATOR IDENTIFIER (THIS FIELD IS THE OPERATOR IDENTIFIER). APN CAN ALSO BE A WILDCARD, IN WHICH CASE SGSN SELECTS THE ACCESS POINT ADDRESS. SEE GSM 09.60 [22] AND GSM 03.60 [8] FOR MORE INFORMATION ABOUT APN FORMAT AND ACCESS POINT DECISION RULES. THE ACCESS POINT NAME IS INFORMATION FROM THE MS OR SGSN, THAT MAY BE USED BY THE GGSN TO DIFFERENTIATE BETWEEN ACCESSES TO DIFFERENT EXTERNAL PACKET DATA NETWORKS USING THE SAME PDP TYPE.	ADAPTER 26 CHARGING APPLICATION
RECORD SEQUENCE NUMBER	C (S-CDR/G-CDR)	THIS FIELD CONTAINS A RUNNING SEQUENCE NUMBER EMPLOYED TO LINK THE PARTIAL RECORDS GENERATED IN THE SGSN/GGSN FOR A PARTICULAR PDP CONTEXT (CHARACTERIZED WITH SAME THE CHARGING ID AND GGSN ADDRESS PAIR). IN THE S-CDR THE SEQUENCE NUMBER IS ALWAYS STARTED FROM ONE AFTER INTER-SGSN ROUTING AREA UPDATE, SEE FIELD "SGSN CHANGE". THE RECORD SEQUENCE NUMBER IS MISSING IF THE RECORD IS THE ONLY ONE PRODUCED IN THE SGSN/GGSN FOR THE PDP CONTEXT (e.g. INTER-SGSN ROUTING AREA UPDATE CAN RESULT TO TWO S-CRSs WITHOUT SEQUENCE NUMBER AND FIELD "SGSN UPDATE" PRESENT IN THE SECOND RECORD).	ADAPTER 26 CHARGING APPLICATION

Fig. 5


300
304
CLIENT
20
ACCESS CONTROLLER
202
WAIN SERVER (VISITED NETWORK)
302
RADIUS SERVER
24
WAIN SERVER OR THIRD PARTY EAP-SIM SERVER (HOME NETWORK)
EAP-SIM AUTHENTICATION OVER RLA
EAP-SIM AUTHENTICATION OVER RADIUS
ACCESS ACCEPT (EAP-SUCCESS, MS-MPPE-Send-Key, MS-MPPE-Recv-Key
GENERATE ONE-TIME-PASSWORD BASED ON MS-MPPE-Send-Key
STORE USERNAME AND ONE-TIME-PASSWORD IN RADIUS DATABASE
EAP-SUCCESS OVER RLA
GENERATE ONE-TIME-PASSWORD BASED ON MS-MPPE-Send-Key
HTTP POST USING USERNAME AND PASSWORD
RADIUS ACCESS REQUEST (USERNAME AND PASSWORD)
RADIUS ACCESS ACCEPT